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sand, resting in one place on end, and much mixed on the surface, sides, and end with gravel and fossils belonging to later formations. Bones of whales and fragments of shells of the Miocene Formation have settled into its broken surface; but in the unmixed interior of the mass, it has yielded to me soft casts of *Gryphaea* and *Cucullea*, hard fragments of the bones of reptiles, with coprolites, and teeth of the shark *Otodus*. The component materials of this marl agree with those of the Lower Marl of New Jersey, and, like the latter, rest directly upon the upper member of the Raritan Formation.

The Miocene Formation, so far as my own observation extended, is broken up, and so mixed with the drift at the base of the glacial deposits near the surface that the only evidence of its former presence here, below the belt of conglomerate, resides in the presence of vertebrae of Cetacea, fossil shells, and some teeth of sharks.

On the surface is the fine pale sand, forming a loose bed, underlaid by about two feet of pebbly conglomerate which rests in a bed of broken rocks, gravel, and boulders. The sand is spread thickly over most parts of the island, and along the western ridge it is set with granitic boulders measuring occasionally twelve feet in length and width by six to eight feet in thickness.

The whole Gay Head promontory is a scene of disturbed equilibrium, where the beds of rock-derived material have been softened by atmospheric agencies, pressed down by a load of stone and gravel, undermined by oceanic strokes of oceanic surf, and let down into gullies by trenching storms of rain.

LETTERS TO THE EDITOR.

** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

A Mountain-Top Experience.

FREMONT PASS, Colorado, is 11,540 feet above the sea. To the east rises a peak by a rather steep slope, perhaps 2,000 feet higher. Its eastern slope is precipitous.

On Aug. 18, alone, I reached the summit of this peak. It was noon. Several miles away to the north a heavy thunder-storm was raging, while far to the west was another. Within a mile or two a massive cloud had formed between the lower mountains which shut in a gorge. I stepped to the very highest point of the peak. My contemplation of the extraordinary view afforded me was disturbed by a sharp buzzing as of bees seemingly beneath my hand which rested on the bulky pine sliver serving as my staff. But on lifting my hand I found no bees large or small.

As the buzzing continued, I vainly scrutinized the stick for signs of life. I then indifferently concluded that it was possibly caused by some boring insect in the wood. That settled (?), I lifted a large roundish rock to toss into the chasm below, when it, too, buzzed or crackled in my hand at a score of points. Close inspection revealed no bees or bugs on that rock. Can it be, I asked, that this rock is crackling from the change of temperature occasioned by a change of position? At that moment, the "bees" were swarming in my hat. Snatching it off, I was searching it for the buzzing things when they seemed to throng my hair. Immediately on raising my hand to my head the puzzling mystery was solved, as the strong flow of electricity fairly tingled and buzzed through my fingers, and, looking up, I saw a cloud forming overhead. I was acting as a lightning-rod to that mountain-peak. Ignorant of my possible safety or danger in the involuntary experiment, I lacked the valor or scientific devotion to prolong it. Securing my box of flowers and that buzzing staff, I discreetly retired some distance down the slope from that summit surcharged with possible electrocution if I remained. Ere I reached the pass, two hours later, the storm from the north had reached the peak, and soon that rocky summit was whitened with snow, while hail and rain fell in the pass.

During my descent, while the thunder-cloud rapidly approached the peak, a strong wind blew through the pass directly toward

the cloud until light rain began to fall. Is my experience as given a common one? Was it a dangerous one?

O. C. CHARLTON.

Denton, Texas.

The Gemination of the Lines in Mars.

As far as one can judge from newspaper reports, the recent observations on Mars render certain the existence of the curious Schiaparelli lines, but as yet nothing has been seen of the doubling, or gemination, which has been claimed. If this negative result shall be sustained by the accounts yet to come from observatories in lower latitudes, there still remains the interesting question, How did such a mistake come to be made?

A bit of personal experience will, I trust, be pardoned, since it points to what seems to me the explanation of the error, if one exists; at least, it shows the existence of a *vera causa* able from single lines to produce double ones. The lens in my left eye possesses the power of double refraction. If I close the right eye and

look at a line drawn obliquely, thus  the paper being held

No. 1.

squarely in front of me, I see nothing peculiar; there is to me, as to anyone else, only one ordinary black line. But if the line

slopes thus  I see two lines  the lower one being

No. 2.

No. 3.

decidedly less deeply black than the other. As I now hold the paper, the bottom towards me, No. 1 appears as a single line, No. 2 as a double one, like No. 3. If now I turn the side of the page towards me, revolving it through an arc of 90°, No. 1 shows double and No. 2 single.

If I draw a set of single lines as below



No. 4.

and look at them with both eyes, or with my right eye alone, I see only so many single lines; but if I close my right eye, then with my left I see ten lines, each original line being geminated by a fainter one exactly parallel, and pretty close to it, as in No. 5.



No. 5.

If now I turn No. 4 to the right or left, the double images will approach each other, and at the same time slide by each other a little until I have turned the paper 90°, when the images will coalesce, each line appearing sharply defined, single, and very black, except at each end, where for about $\frac{1}{16}$ of an inch the color will be fainter and the line less sharply defined. I can vary my experiments in many ways, each time getting the well-known phenomena of double refraction.

The application to the lines in Mars is very simple. If a person possessing an eye with this power should see the planet's image in the telescope, and be able to perceive the Schiaparelli lines, he would see each accompanied by a twin line of the same length, but not quite so sharp and distinct. If the lines ran, as in No. 1, from north-west to south-east, he would not see the secondary ones, but if his other eye chanced also to have a double refracting lens with axis at right angles to the first, he would then see the secondary lines in the same way.

I know, from my own experience, that one may possess this power without being conscious of it. I discovered it only when experimenting on single vision. In ordinary use (i. e., with both eyes) I cannot perceive any indication of it, the greater illuminating power of the ordinary ray, plus that of my other eye, com-